

**NEW SPECIES OF *PERDITA* (*PYGOPERDITA*) TIMBERLAKE
OF THE *P. CALIFORNICA* SPECIES GROUP
(HYMENOPTERA: ANDRENIDAE)**

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Abstract.—Three new species of *Perdita* (*Pygoperdita*) of the *P. californica* group are described from the southwestern United States. *Perdita meconis* NEW SPECIES, from the Mojave Desert, is associated with two genera of Papaveraceae, *Argemone* and the endangered dwarf bearclaw poppy, *Arctomecon humilis* Coville. *Perdita ute* NEW SPECIES, from the San Rafael Desert of central Utah, is also associated with *Argemone*. The floral association of *P. angellata* NEW SPECIES, from the Colorado Plateau of northern Arizona, is unclear. A key to males is presented.

Key Words.—Insecta, Andrenidae, *Perdita*, Papaveraceae, *Argemone*, *Arctomecon*

Recent collections of pollinators that were made in connection with studies on the pollination of the endangered dwarf bearclaw poppy, *Arctomecon humilus* Coville, yielded a new species of *Perdita* (*Pygoperdita*) Timberlake. It is described here to make the name available for those studies. Two additional closely related species, one needed for a study in progress on the fauna of the San Rafael Desert, Utah, are also described.

Males of the three species described here, together with *P. argemones* Timberlake, form a subgroup of the *P. californica* species group of *P.* (*Pygoperdita*) that can be distinguished from all other members of the *P. californica* group by the structure of tergum 7 (T7). In these species, the apical lobes of T7 are wide (nearly horizontal), the lateral preapical angles are acute, and there is no transverse preapical carina separating the base of the segment from the apical lobes.

Characterization of the females is difficult. There is currently no way to distinguish between females of the *P. interrupta* Cresson and *P. californica* species groups (Timberlake 1956). So it should not be surprising that no unique combination of characters could be found to distinguish females of this subgroup from other species of the *P. californica* group. Females of all four species can be separated from most other *P.* (*Pygoperdita*) by the combination of obscure facial fovea, sparse scutal punctation, distinctly maculated metasoma, and a complete basitibial plate on the hind leg. However, *P. cowaniae* Timberlake, *P. duplonotata* Timberlake, *P. fallugiae* Timberlake, *P. distropica* Timberlake, *P. mohavensis* Timberlake, and *P. robustula* Timberlake also possess these traits. Therefore, no key to the females is presented here; rather the position of each species in Timberlake's 1956 key is given.

KEY TO MALES

1. Facial marks yellow; galea lightly shagreened 2
- Facial marks white; galea polished 3
- 2(1). Frons, scutum shagreened anteriorly; metasoma dark with yellow markings; apical lobes of T7 thickened apically *meconis* NEW SPECIES

- Frons, scutum polished anteriorly; metasoma uniformly with a red hue, except for small dark marks; apical lobes of T7 not thickened apically . . .
 *argemones* Timberlake
- 3(1). Facial fovea dull; scutum uniformly green; light maculations of metasoma broad, on T2–3 encircling oval lateral spots; apical lobes of T7 not thickened apically *ute* NEW SPECIES
- Facial fovea shiny; scutum centrally black with purple reflections; maculations of metasoma narrow, on T2–3 not encircling oval lateral spots; apical lobes of T7 thickened apically *angellata* NEW SPECIES

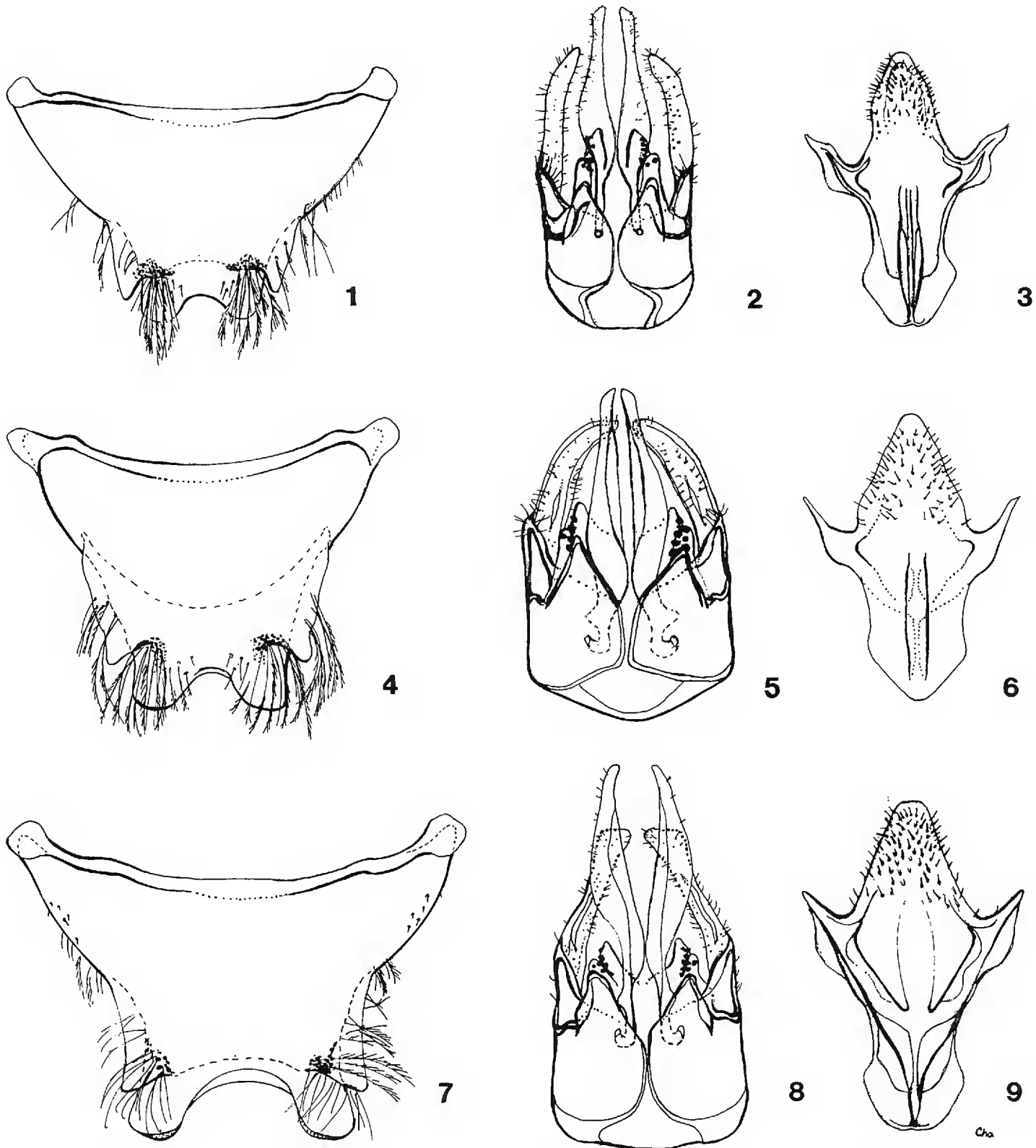
PERDITA MECONIS, NEW SPECIES

(Figs. 7–9, 12)

Types. — Holotype male. UTAH. WASHINGTON Co.: Warner Ridge, Beehive Dome, 19 May 1988, 8:30–9:00 AM, *Arctomecon humilis* Coville, B. Snow. Holotype deposited in USDA Bee Biology and Systematics Collection, Logan, Utah. Paratypes: CALIFORNIA. SAN BERNARDINO Co.: Cottonwood Wash, 768 m (2520 ft), T9N R12E Sec. 3, 10 May 1982, *Argemone*, T. Griswold, 5 males, 1 female; same except 2 Jun 1980, no floral record, 1 female; Kelso Dunes, 664 m, (2180 ft), T10N R13E Sec. 7, 15 May 1980, mating pair, T. Griswold, 1 male, 1 female; same except *Argemone*, 14 males; Kelso Dunes, 655 m (2150 ft), T10N R13E, 2 May 1980, *Argemone*, T. Griswold, 4 males; Winston Wash, 588 m (1930 ft), T10N R12E Sec. 3, 15 Apr 1980, *Argemone*, T. Griswold, 5 males. UTAH. WASHINGTON Co.: Same data as holotype, 1 male, 2 females; same except 20 May 1988, 2 males, 3 females; same except 20 May 1988, 8:00–8:30 AM, 1 male, 1 female; same except 20 May 1988, 9:00–9:30 AM, 1 male, 1 female; same except mating pair, 18 Apr 1989, 8–10 AM, 1 male, 1 female; same except 24 Apr 1989, 11:30–11:40 AM, 1 female; same except 24 Apr 1989, 10:25–10:30 AM, 1 male. Paratypes deposited in USDA Bee Biology and Systematics Collection, Logan, Utah, and University of Kansas, Lawrence.

Male. Length 5 mm. Forewing length 4 mm. Head and mesosoma dark green except: propodeum blue-green; pale yellow on mandible, labrum, face below level of antenna, ventral triangular area on gena, submedial transverse line on pronotal collar, pronotal lobe. Antenna yellow below, brown above. Legs black except: pale yellow on femora apically, anterior stripe on fore- and midtibia, fore- and midtarsi; hindtarsi dark brown. Wings hyaline, veins milky white except subcosta brown. Metasoma with T1 dark green turning brown on posterior margin; T2 with basal yellow stripe narrowly broken medially, pair of lateral very dark brown oval spots joined medially by narrow brown stripe, posterior third of segment amber; T3 similar but oval spots less well defined, brown stripe evanescent; T4 amber except for ill-defined, lighter brown oval spots; T5–7 amber. S1 black; S2–6 amber. Frons strongly shagreened, moderately covered with fine punctures. Mesosoma lightly shagreened except shiny medial portion of scutum and scutellum; scutal punctures fine, sparse especially medially. Head broader than long, inner orbits parallel. Facial fovea dull, obscure. Galea lightly shagreened, as long as eye length, pointed apically. T7 as in Fig. 7, apical lobes oblique, almost vertical, in posterior view, apically thickened. S8 as in Fig. 9. Genitalia as in Fig. 8.

Female. — Length 6.5–7 mm. Forewing length 4.5–5 mm. Color as in male except pale yellow markings of head and mesosoma restricted to mandible, apical spot on labrum, clypeus except for pair irregular, often interrupted, vertical lines, pair very narrow supraclypeal lines, triangular paraocular area. Legs dark brown except for pale yellow on apex of fore- and midfemora and anterior stripe on foretibia. Metasomal terga dark brown except with green caste on T1, T2 with basal stripe narrowly interrupted medially, T3–4 similar but with progressively wider marks; T5 mostly yellow except for basolateral spot and subapical area (Fig. 12). Sterna amber-yellow except S1 brown, S2–4 with diffuse lateral brown spots. Punctuation and sculpture as in male. Head distinctly wider than long. Clypeus

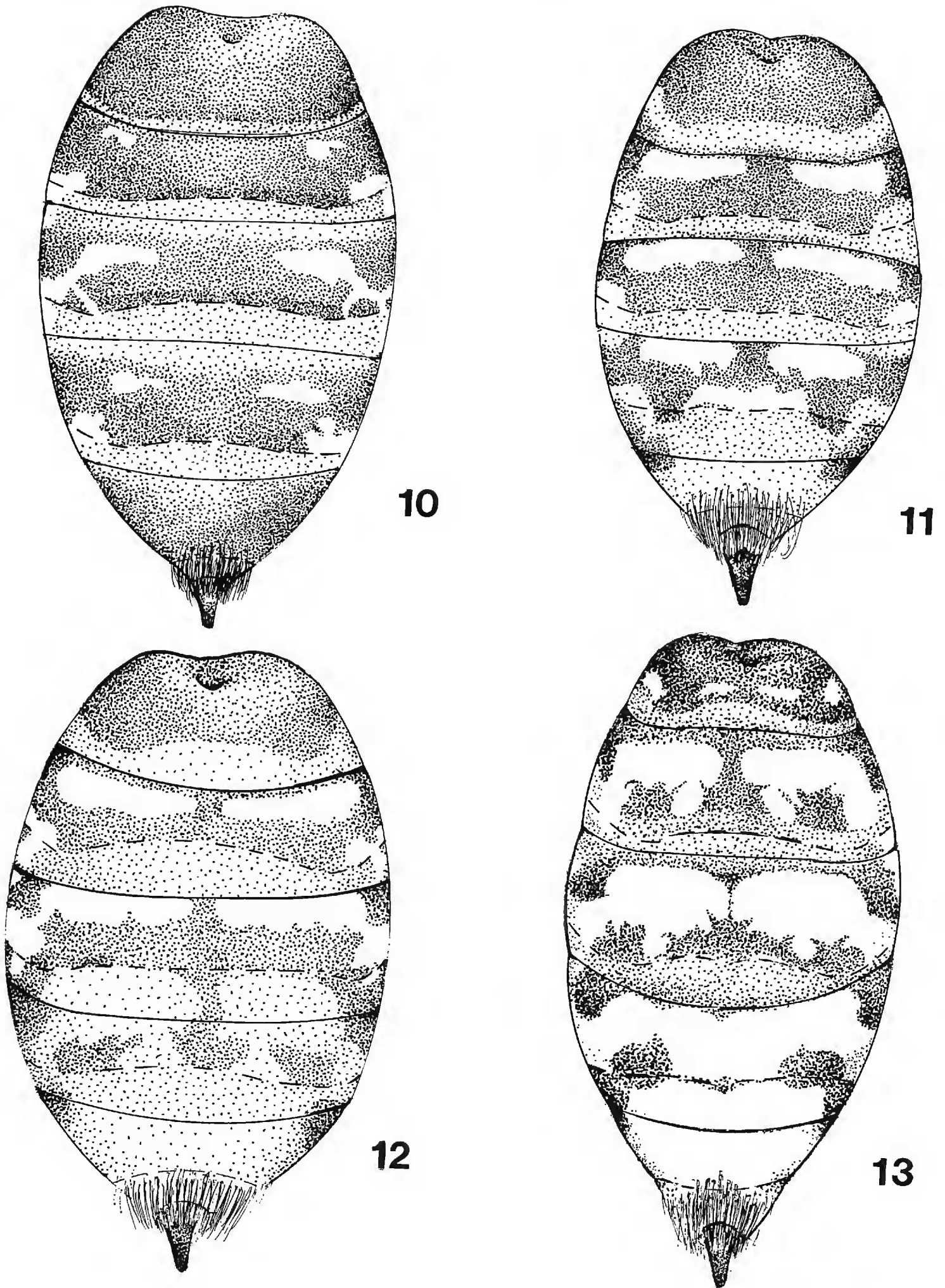


Figures 1–9. Male metasomal structures. Figure 1. *Perdita ute*, T7 in dorsal view. Figure 2. *Perdita ute*, genitalia in dorsal view. Figure 3. *Perdita ute*, S8 in ventral view. Figure 4. *Perdita angellata*, T7 in dorsal view. Figure 5. *Perdita angellata*, genitalia in dorsal view. Figure 6. *Perdita angellata*, S8 in ventral view. Figure 7. *Perdita meconis*, T7 in dorsal view. Figure 8. *Perdita meconis*, genitalia in dorsal view. Figure 9. *Perdita meconis*, S8 in ventral view.

dentate adjacent to labrum. Facial fovea linear, extending from level of lower margin of antennal socket to approximately half distance between antennal socket and median ocellus. Pygidial plate rather abruptly narrowed apically, strongly curved ventrally in lateral view.

Diagnosis. — See key.

Variation. — Males range in size from 4.5–5.5 mm long. Extent of maculations varies in males. Some individuals have the paraocular mark reduced adjacent to the subantennal suture. General metasomal coloration is darker in some individuals.



Figures 10–13. Female metasoma, dorsal view showing markings. Figure 10. *Perdita angellata*. Figure 11. *Perdita argemones*. Figure 12. *Perdita meconis*. Figure 13. *Perdita ute*.

Etymology.—From the Latin “mecon,” meaning poppy, because this bee is apparently limited in pollen collection to Papaveraceae.

Distribution.—Known only from the eastern Mojave Desert, where it is associated with *Arctomecon* and *Argemone* (Papaveraceae).

Discussion.—In the key to *P.* (*Pygoperdita*) (Timberlake 1956), males of *P. meconis* key to couplet 73, where they do not agree well with either part of that couplet. The female keys to couplet 23, where it may be distinguished from the subspecies of *P. wyomingensis* Cockerell (as *P. sculleni* Timberlake subspecies; see Timberlake 1968) by the following: longer mouthparts, scutum lightly shagreened anteriorly, scutal punctation more dense, T4 mostly and T5 entirely yellow.

Material Examined.—See types.

PERDITA UTE, NEW SPECIES
(Figs. 1–3, 13)

Types.—Holotype male. UTAH. *EMERY Co.*: 5.1 air km (3.2 mi) NE Little Gilson Butte, 1524 m (5000 ft), 3 Jun 1981, F. D. Parker. Holotype deposited in USDA Bee Biology and Systematics Collection, Logan, Utah. Paratypes all: UTAH. *EMERY Co.*: same data as holotype, 3 males, 14 females; same except, 3 Jun 1991, *Argemone corymbosa* Greene, T. Griswold, 2 males; same except 30 May 1991, 1 male; near Little Gilson Butte, 1554 m (5100 ft), 3 Jun 1991, *Argemone corymbosa*, T. Griswold, 4 males; same except, 13 Jun 1991, 1 female; E edge San Rafael Reef, 3.2 km (2 mi) S Interstate Hwy-70, 1347 m (4420 ft), 3 Jun 1991, T. Griswold, 1 female. Paratypes in USDA Bee Biology and Systematics Collection, Logan, Utah, and University of Kansas, Lawrence.

Male.—Length 4.5 mm. Forewing length 4 mm. Head and mesosoma dark blue-green except: cream-colored markings on mandible, labrum, clypeus except for pair small dark dots, subantennal area, pair spots on supraclypeal area, elongate triangular ventral area on gena, small spot on pronotal lobe. Antenna pale yellow below, dark brown above. Legs dark brown except: pale yellow on femora apically, fore- and midtibia except posterior longitudinal stripe, narrow ventral stripe on posterior tibia, fore- and midtarsi; hindtarsi light brown. Wings hyaline, veins off-white except subcosta dark brown. Metasoma dark brown (except T1 almost entirely dark blue-green), with pale yellow marks as follows: T1 on extreme apicolateral margin, T2 wide basal stripe very narrowly interrupted medially, narrow subapical line medially, small subapical patch laterally; T3 like T2 but light areas coalescing to form triangular medial and oval lateral dark spots; T4 as in T3 but dark lateral spot not margined posteriorly by thin yellow line; T5 with wide V-shaped medial mark and lateral spot, T6 subapical margin; T7 amber. S1–6 with subapical light bands. Frons strongly shagreened, moderately covered with fine punctures. Mesosoma lightly shagreened except scutellum shiny medially; scutal punctures fine, sparse especially medially. Head broader than long, inner orbits parallel. Facial fovea dull, obscure. Galea polished, nearly as long as eye length, apically pointed. T7 as in Fig. 1, apical lobes oblique, almost vertical in posterior view, apically not thickened. S8 as in Fig. 3. Genitalia as in Fig. 2.

Female.—Length 5.5 mm. Forewing length 4.5 mm. Color as in male except quadrangular area posteriorly on scutum, scutellum black; cream markings restricted to mandible, labrum laterally, clypeus except pair vertical stripes, triangular paraocular area. Legs dark brown except pale yellow on apices of femora, anterior portion of fore- and midtibia. T1 dark blue-green except for 2 pair pale yellow spots apically; T2–5 pale yellow except: white medially on T4, light brown basally and apically, dark brown oval spots apicolaterally on T2–4 and subapical area medially on T2–3 (Fig. 13). Sterna amber except for diffuse pale yellow transverse stripes on S3–4. Punctation and sculpture as in male. Head distinctly wider than long. Clypeus dentate adjacent to labrum. Facial fovea linear, extending from level of middle of antennal socket to approximately half distance between antennal socket and median ocellus. Pygidial plate evenly narrowed apically, slightly curved ventrally in lateral view.

Diagnosis. — See key.

Variation. — Light metasomal markings of one male more extensive than those of holotype. Females vary slightly in extent of metasomal maculations.

Etymology. — Named for the Ute Indians, who inhabited the San Rafael Desert.

Distribution. — Known only from the sand dune areas of the San Rafael Desert, Colorado Plateau.

Discussion. — Males key to couplet 73 in the key to *Perdita* (*Pygoperdita*) (Timberlake 1956) where they do not agree well with either option. The female keys to couplet 22 (if you assume the black on the scutum to be limited, as in *P. duplonotata* Timberlake) where it differs from both *P. nitens* Timberlake and *P. duplonotata* by the continuous, or at most very narrowly interrupted, light metasomal bands. The abdominal markings of *P. ute* are quite similar to those of *P. argemones* (Fig. 11), but the background color of the first few terga is black, not dark brown, and the light markings of T2–4 are larger, with the transverse basal marks usually joining the posterolateral ones.

Material Examined. — See types.

PERDITA ANGELLATA, NEW SPECIES
(Figs. 4–6, 10)

Types. — Holotype male. ARIZONA. COCONINO Co.: 32.2 km (20 mi) N Cameron, 3 May 1972, *Sphaeralcea*, F. Parker, P. Torchio, G. Bohart. Paratypes, same data as holotype, 2 males, 1 female. Holotype and paratypes in USDA Bee Biology and Systematics Collection, Logan.

Male. — Length 5.5 mm. Forewing length 4.5 mm. Head with frons and vertex olive green; gena, except ventrally, dark green; paraocular area above white mark dark blue; mandible except apically, labrum, clypeus except for pair dark dots, emarginate supraclypeal mark, subantennal area, quadrangular mark on paraocular area with short narrow extension along eye, small triangular mark on lower gena white. Antenna yellow below, brown above. Mesosoma dark green except for quadrangular purplish area posteriorly on scutum, darker bronze scutellum. Wings hyaline, veins light brown except subcosta dark brown. Legs brown, except yellow apically on femora, and anteriorly on fore- and midtibia, fore- and midtarsi yellow-brown. Terga dark brown except T1 with greenish reflections, pale yellow markings on lateral corners of T1–5 and linear, medially interrupted, transverse basal bands on T2–4. S1 dark brown, S2–6 yellow-brown. Frons strongly shagreened, moderately covered with fine punctures. Mesosoma lightly shagreened except shiny medial portion of scutum and scutellum; scutal punctures fine, sparse especially medially. Head broader than long, inner orbits slightly converging above. Facial fovea shiny, distinct. Galea polished, as long as eye length, pointed apically. T7 as in Fig. 4, apical lobes oblique in posterior view, thickened apically. S8 as in Fig. 6. Genitalia as in Fig. 5.

Female. — Length 6.5 mm. Forewing length 4.5 mm. Color as in male except paraocular area less strongly blue, white markings of head and mesosoma restricted to mandible basally, lateral quadrate mark on clypeus, triangular paraocular mark. Legs dark brown except for pale yellow on apex of fore- and midfemora and anterior stripe on foretibia. Terga brown except: T2 with irregular, narrow basal stripe widely interrupted medially, small apicolateral spot; T3 similar but with wider regular basal mark joining apicolateral spot; T4 as in T2 except basal stripe not as narrow, not irregular; T5 with small apicolateral spot. Sterna brown. Punctuation and sculpture as in male. Head distinctly wider than long. Clypeus dentate adjacent to labrum. Facial fovea linear, extending from level of lower margin of antennal socket to midpoint between antennal socket and median ocellus. Pygidial plate evenly narrowed apically, slightly curved ventrally in lateral view.

Diagnosis. — See key.

Variation. — Extent of facial maculations is reduced in one paratype. The basal maculations of the metasomal terga are also reduced in the paratype males.

Etymology.—From the Latin “angellus,” small angle, for the distinctive small lateral angles of male T7 which distinguish this subgroup from other *P.* (*Pygoperdita*).

Distribution.—Known only from the southern portion of the Colorado Plateau in northern Arizona.

Discussion.—Males of *Perdita angellata* key to couplet 73 in Timberlake’s 1956 key to the species of *Perdita* (*Pygoperdita*), where they do not agree well with either option. The female keys to couplet 22 (if the first half of couplet 11 is chosen), where it differs from both *P. nitens* Timberlake and *P. duplonotata* Timberlake by the completely black medial portion of the clypeus, the reduced markings of T4 and the absence of light markings on T5. If the second half of couplet 11 is chosen, it keys to *P. mohavensis* Timberlake in couplet 35, where it differs by its shorter tongue.

Material Examined.—See types.

ACKNOWLEDGMENTS

Thanks to Bryan Danforth and Roy Snelling for reviewing the manuscript. Bonnie Snow and Susan Geer, under the supervision of Vincent Tepedino, conducted the field work which netted the type series of *Perdita meconis*. I also thank Ralph Gierisch, retired BLM botanist, for bringing the *Arctomecon humilis* site to their attention. Work was funded by the USDA-APHIS Grasshopper IPM project. Marianne Cha Filbert produced the illustrations.

This is a contribution from Utah Agricultural Experiment Station, Utah State University, Logan, UT 84322-5310, Journal Paper No. 3952, and USDA, Agricultural Research Service, Bee Biology & Systematics Laboratory, Utah State University, Logan, UT 84322-5310.

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Received 17 July 1992; accepted 1 March 1993.